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PHOENIX, AZ 85018

EXAMINER

LEUNG, JENNIFER A

ART UNIT PAPER NUMBER

1764

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/649,528

Applicant(s)

KORIPPELLA ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-18, 20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18, 20 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 02 April 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's Amendment submitted on April 2, 2003 has been received and carefully considered. The submitted changes to the Specification and Drawings are acceptable. Claim 19 has been cancelled. Claims 1-18, 20 and 21 remain active.

### ***Claim Objections***

2. Claims 1, 12 and 18 are objected to because of the following informalities:
- In claim 1, line 4, "the monolithic structure" should be changed to -- the monolithic ceramic carrier -- for consistency in claim terminology, as set forth in line 2.
  - In claim 12, line 2 and claim 18, line 6, -- structure -- should be inserted after "the ceramic carrier" for consistency in claim terminology, as set forth in claim 11, line 2 and claim 18, line 2.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 1, it is unclear as to the structural limitation applicants are attempting to recite by, "at least one channel formed in the monolithic structure and having a

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catalyst material formed therein for transporting a vapor in the vaporization zone" (lines 4-5), since it appears that applicants are providing a catalyst material in the channels of the vaporization zone, and it is unclear as to where such a limitation is disclosed in the specification and drawings. In the specification (page 18, last paragraph), it appears that only "an inert porous ceramic material for thermal control" is provided in the channels of the vaporization zone. Similarly, note claim 11, which recites, "at least one of the vaporization zone and the reaction zone including one of a plurality of parallel channels or at least one serpentine channel formed in the monolithic ceramic structure and having a catalyst formed therein" (lines 4-6).

With respect to claim 2, it is unclear as to the relationship between "a vaporization zone" in line 2 and "a vaporization zone" set forth in claim 1, line 5.

With respect to claim 12, it is unclear as to the relationship between "an integrated heater" in line 2 and "an integrated heater" set forth in claim 11, line 7.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-8, 10-16, 18, 20 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsu et al. (U.S. 5,858,314).

With respect to claims 1 and 2, Hsu et al. (FIG. 1, 2A-2C) disclose an apparatus comprising:

- A monolithic ceramic carrier (column 6, lines 22-29) defining a fuel processor, the fuel

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processor including a vaporization zone (i.e., the region to “pre-heat the incoming reactants... to near operation temperatures, e.g., at least about 300° C”; column 5, lines 42-45, 64-68) and a reaction zone (i.e., defined by reformer plates **14**) including a reforming catalyst material **36**;

- At least one channel formed in the monolithic structure and having a catalyst material formed therein for transporting a vapor in the vaporization zone (i.e., passages formed by plates **12**, **14**; FIG. 1, 2A-C);
- An inlet channel (i.e., via axial manifold **16**) for introducing liquid fuel into the fuel processor (column 4, lines 31-41); and
- An outlet channel (i.e., via exit conduits **32**) for transporting hydrogen enriched gas out of the fuel processor.

With respect to claims 3 and 7, Hsu et al. further disclose an integrated heat source (i.e., via conductive plates **12**; column 5, lines 37-42, 54-68; column 8, lines 4-column 9, line 7) thermally coupled to the reaction zone and vaporization zone using thermally conductive channels or thermally conductive vias (i.e., conductive plate **12** comprising “any surface indentation or protrusions, which can be formed by embossing”; column 4, lines 46-55).

With respect to claims 5 and 6, Hsu et al. disclose the integrated heat source may comprise a chemical heater including a catalyst for oxidizing fuel to produce heat (i.e., combustion band **92** for providing thermal energy to the endothermic reforming reactions; column 5, lines 46-68, FIG. 5; column 8, line 4 - column 9, line 7), wherein the chemical heater further comprises an air inlet for providing oxygen for the oxidation of the fuel and the inlet channel **16** includes an opening to provide fuel to the chemical heater (column 8, lines 11-16).

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With respect to claim 8, Hsu et al. disclose the vaporization zone and the reaction zone comprising a plurality of parallel channels (i.e., passages formed by plates **12, 14**; FIG. 1, 2A-C).

With respect to claim 10, Hsu et al. disclose the ceramic carrier is a monolithic three-dimensional multi-layer ceramic structure (FIG. 1, 2A-2C; column 6, lines 22-29).

With respect to claims 11, 12 and 18, the same comments with respect to Hsu et al. apply (i.e., see comments made in claims 1-3, 7-8 and 10 above)

With respect to claims 13, 14, 20 and 21, the same comments with respect to Hsu et al. apply (i.e., see comments made in claims 5 and 6 above).

With respect to claim 15, the same comments with respect to Hsu et al. apply (i.e., see comments made in claims 3 and 7 above).

With respect to claim 16, the same comments with respect to Hsu et al. apply (i.e., see comments made in claim 8 above).

Instant claims 1-3, 5-8, 10-16, 18, 20 and 21 structurally read on the apparatus of Hsu.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 4, 9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. (U.S. 5,858,314) in view of Ghosh et al. (U.S. 5,961,932).

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With respect to claim 4, Hsu et al. are silent as to whether the integrated heat source (via conductive plates 12) may be specifically a resistive heater that is electrically driven. However, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a resistive heater for the integrated heat source in the apparatus of Hsu et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since the use of resistive heaters as a reaction heating means is conventionally known in the art, as evidenced by Ghosh et al. In particular, Ghosh et al. teach an embedded heating element 38 made from... high-temperature resistive metals or metallic alloys and driven by electrical leads 40 for heating the apparatus (column 5, lines 19-28). Furthermore, it has been held that the substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

With respect to claims 9 and 17, Hsu et al. disclose a plurality of channels, which may comprise "any surface indentations or protrusions, which can be formed by embossing..." (column 4, lines 46-55). However, Hsu et al. are silent as to whether the channels may comprise a serpentine shape. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select "serpentine" shaped channels for the plurality of channels in the apparatus of Hsu et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since it has been held that changes in shape involves only ordinary skill in the art. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878). Furthermore, to evidence the

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conventionality of providing serpentine shaped channels, Ghosh et al. teach that the configuration of serpentine, complex, wavy, winding and angular meandering forms allows variation in reaction time in a given reaction zone (column 5, lines 15-25).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-18, 20 and 21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-21 of U.S. Patent No. 6,569,553. Although the conflicting claims are not identical, they are not patentably distinct from each other.

With respect to instant claims 1-18, 20 and 21, U.S. '553 claims substantially the apparatus as recited, comprising:

- A three-dimensional monolithic multi-layer ceramic carrier comprising a vaporization zone and a reaction zone including a reforming catalyst (a fuel reformer), further comprising an inlet channel and an outlet channel (i.e., reference claims 1, 2, 10, 11, 18);
- At least one channel (a plurality of parallel or serpentine micro channels) formed in the vaporization zone and/or the reaction zone (i.e., reference claims 1, 8, 9, 11, 16-18); and



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- An integrated heater coupled to the vaporization and reaction zones via thermally conductive structures or channels, wherein the heater may comprise an integrated resistive heater that is electrically driven or a chemical heater comprising an air inlet for providing oxygen via the inlet channel and a catalyst for oxidizing a fuel to produce heat (i.e., reference claims 1, 3-7, 11-15, 18-21).

### ***Response to Arguments***

7. Response to Arguments filed on April 2, 2003 with respect to the rejection of claims 1-4 and 10-13 under 35 U.S.C. 102(b) as being anticipated by Ahmed et al. (page 17, first paragraph to page 18, second paragraph) have been fully considered and are persuasive. Therefore, said rejections have been withdrawn.

8. Applicant's arguments filed on April 2, 2003, with respect to the rejection of claims 1-3 and 5-21 under 35 U.S.C. 103(a) as being unpatentable over Autenrieth in view of Ghosh et al. (page 20, second paragraph to page 21, last paragraph) have been fully considered and are persuasive. Therefore, said rejections have been withdrawn.

9. Applicant's arguments filed on April 2, 2003 with respect to the rejection of claims 1-3, 5-8, 10-16, 18, 20 and 21 under 35 U.S.C. 102(b) as being anticipated by Hsu et al., and the rejection of claims 4, 9 and 17 under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. in view of Ghosh et al. have been fully considered but they are not persuasive.

Applicants argue that unlike the apparatus of Hsu et al., "The required features of the various components (vaporizer, reformer, combustor etc. in the fuel reformer unit) required for the final unit are processed separately on *individual ceramic sheets in green state (unsintered)* and then they are laminated maintaining the structural integrity *and sintered to form a monolithic*

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*ceramic unit*,” (emphasis added; page 15, second paragraph, lines 4-8). However, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the feature upon which applicant relies (i.e., an integral sintered ceramic structure) is not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In addition, according to the American Heritage® Dictionary of the English Language, Fourth Edition (Copyright © 2000 by Houghton Mifflin Company), the term “monolithic” may be defined as follows:

1. Constituting a monolith
2. Massive, solid, and uniform
3. *Constituting or acting as a single, often rigid, uniform whole*

The Examiner asserts that Hsu et al. discloses a reactor built of discrete pieces of ceramic plates, with catalyst deposited on the plates and having thermally conducting plates interleaved between the ceramic plates, and gas manifolds to feed reactants and to produce output gases. Although the ceramic plates are discrete, assembly of the plates with the interleaved, thermally conducting plates creates an integral reformer unit, which *acts as a single, rigid, uniform whole*. Therefore, the apparatus of Hsu et al. satisfies applicant's recitation of a “monolithic three-dimensional multi-layer ceramic structure” in the claims.

Finally, regarding the reference combination of Ghosh et al. with Hsu et al., applicants assert that Ghosh et al. describes, “a simple reactor with microfluidic connections for reactants mixing, filtering and reactions, and *does not describe the essential features required for the generation of hydrogen from hydrocarbon fuels such as methanol*,” (emphasis added; page 19,

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line 5-9). However, the Examiner asserts that the Ghosh et al. reference is merely provided to illustrate the conventionality of using serpentine channel shapes and electrical type heating means for known channels and heating means, respectively, and not for providing the hydrogen generating features as cited by applicants.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951.

The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung  
June 10, 2003 *JAL*

*Hien Tran*

**HIEN TRAN  
PRIMARY EXAMINER**